
Catalyst 3900 Series — Token Ring Switches

Product Overview

The Cisco Systems Catalyst 3900 Series is a family of second-generation Token Ring switches that combines unsurpassed performance and functionality with a cost-effective price, ideally suited for desktop connectivity.

The Catalyst 3900 comes with 20 fixed ports and a unique FlexSlot that can accommodate two expansion modules or, in the future, one double-wide module. Available expansion modules include a 1-port ATM OC-3c uplink, a 2-port fiber and copper Inter-Switch Link (ISL) uplink for Token Ring transport over Fast Ethernet, a 4-port fiber Token Ring module, and a 4-port copper Token Ring module. The Catalyst 3920 comes standard with 24 fixed ports and combines the unsurpassed performance and functionality of the Catalyst 3900, with an even more cost effective price, making switching to the desktop a technically superior option to legacy shared-media hub attachments.

Both the Catalyst 3900 and 3920 offer a stack port (optional on the 3900, built-in on the 3920) which allows two units to be interconnected back-to-back, or up to eight units to be interconnected using the Catalyst 3020 Matrix Switch.

Configuration

The Catalyst 3920 can also be connected to the Cisco 600-watt Redundant AC Power System (RPS); see the “Power Supplies and Power Cords” chapter.

For both switches, an application-specific integrated circuit (ASIC) design results in low-latency, wire-speed switching of unicast, multicast and broadcast frames at either half- or full-duplex speeds, regardless of whether they are source-route bridged (SRB), source-route transparently bridged (SRT), or source-route switched (SRS). Adaptive cut-through switching optimizes performance while providing protection from network errors by automatically switching to store-and-forward when errors reach a user-defined threshold.

To address the needs of delay-sensitive data, such as multimedia, this switching fabric contains two priority data queues that can be set by the user. By default, frames assigned a priority of 5, 6 or 7, such as multimedia transmissions, are sent to the high-priority queue and given forwarding preference. Frames assigned a priority of 4 or lower are processed through the normal-priority queue.

For a bandwidth boost, SRS and dynamic ring learning enable the Catalyst 3900 series switches to easily replace an existing Token Ring hub or media access unit (MAU) with no configuration required. In the presence of source-routed traffic, the Catalyst 3900 and Catalyst 3920 automatically learn the ring numbers and forwards frames to downstream bridges based on next-hop information in the Routing Information Field (RIF). Non-source routed (NSR) frames are transparently bridged. There is no need to reconfigure your existing network numbering plan when adding a Catalyst 3900 series switch to the network infrastructure.

The Catalyst 3900 series switches provide a wide range of connectivity options for maximum flexibility. Each Token Ring port supports Dedicated Token Ring (DTR), the IEEE standard that defines direct station attachment at 4, 16, or 32 Mbps. Furthermore, on the Catalyst 3900 ports 19 and 20 support RI/RO connectivity in addition to DTR. The 4-port fiber module of the Catalyst 3900 supports 802.5J for fiber lobe extension and ring in/ring out (RI/RO) in addition to the proprietary RI/RO signaling used by the IBM 8230.

Shielded RJ-45 ports support both 150-ohm shielded twisted-pair (STP) and 100-ohm unshielded twisted pair (UTP). There is no need for external media filters; nor is there a requirement for adapters to do impedance matching for different cable types.

Traffic filters that block or allow traffic are integrated into the bridging ASICs. As a result, enabling MAC address filtering on inbound ports and destination service access point (DSAP) and Subnetwork Attachment Point (SNAP) type filters on inbound and outbound ports has no effect on the media-rate performance of the switch. In addition, in configurations where SRT is used between ports or groups of ports, it is possible to control whether traffic is transparently bridged or source-route bridged on a per-protocol basis. This feature is ideal for environments that have redundant Systems Network Architecture (SNA) gateways and IP or IPX file servers that are not configured for SRB. With this capability, ports with SNA gateways can be configured to receive only SRB traffic, preserving the ability to have multiple gateways with the same MAC address, while also eliminating unnecessary transparently bridged traffic. Likewise, the switch ports with only IP or IPX servers can be configured to receive only the protocol traffic destined for them.

All-routes explorer reduction provides traffic control for networks with multiple user rings connected to dual-backbone segments. With this feature, when a client station sends an explorer frame, the switch forwards a copy of only one frame if it has not already been seen by the switch on any of its other ports. Therefore, in a dual-backbone configuration, each user ring receives only two copies of the broadcast. In this way, the client stations still learn backup paths to their servers, and the user rings are protected from unnecessary broadcast traffic. User-configurable broadcast thresholds are provided to protect end systems from excessive explorer traffic. Priority queues within the switch ensure that delay-sensitive traffic, such as multimedia applications, are forwarded first.

The Catalyst 3900 provides a wide range of options for a high-speed, scalable interconnection between switches. The ATM OC-3c uplink offers ATM Forum-compliant LAN Emulation 1.0. In addition, a frame-based alternative to ATM is provided by an ISL uplink that enables Token Ring transport over Fast Ethernet. A third alternative, available with the TokenChannel feature, allows you to group up to eight ports together as one logical port for up to 256 Mbps of bandwidth between switches.

Figure 21-4: Catalyst 3900 Front View

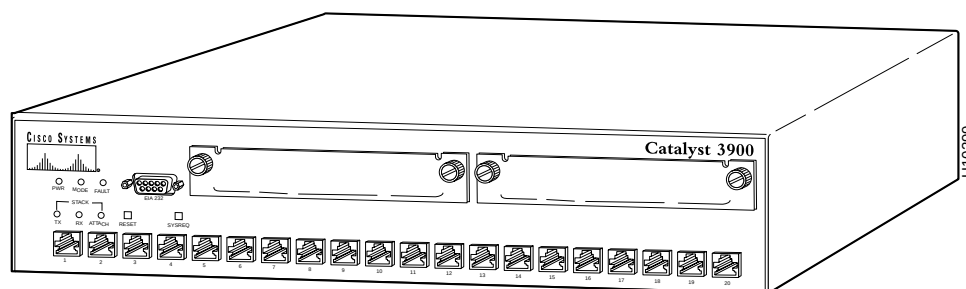
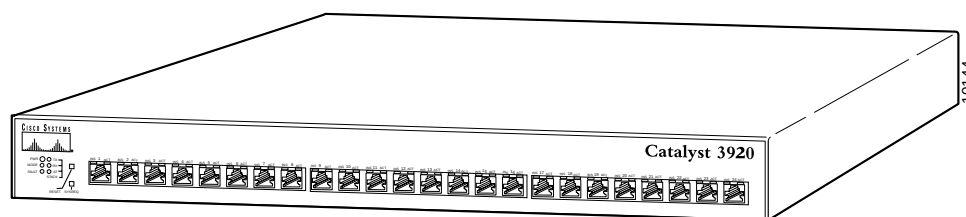


Figure 21-5: Figure 8-11: Catalyst 3920 Front View



Key Features and Benefits

Catalyst 3900 Features:

The Catalyst 3900 has the following features:

- 20 shielded Token Ring ports for 150-ohm STP or 100-ohm UTP connectivity
- FlexSlot accommodating two expansion modules or one double-wide module for future expansion
- Nine-pin EIA/TIA-232 interface for local console or modem connectivity
- Support for the following bridging modes: SRS, SRB, SRT
- Adaptive cut-through switching
- Automatic 4, 16, and 32 Mbps speed adaptation
- Automatic shared and dedicated adaptation (DTR)
- Two priority queues for multimedia traffic
- TokenChannel switch interconnect
- MAC address and protocol (DSAP/SNAP) filters

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- All-routes explorer reduction
 - Broadcast rate protection
 - IEEE and IBM Spanning-Tree Protocol

Catalyst 3920 Features:

The Catalyst 3920 provides the following features:

- 24 shielded Token Ring ports for 150-ohm STP or 100-ohm UTP connectivity
- Nine-pin EIA/TIA-232 interface for local console or modem connectivity
- Support for the following bridging modes: SRS, SRB, SRT
- Adaptive cut-through switching
- Automatic 4, 16 and 32 Mbps speed adaptation
- Automatic shared and dedicated adaptation (DTR)
- Two priority queues for multimedia traffic
- TokenChannel switch interconnect
- MAC address and protocol (DSAP/SNAP) filters
- All-routes explorer reduction
- Broadcast rate protection
- IEEE and IBM Spanning-Tree Protocol

Configurations larger than 20 Token Ring LAN segments can be constructed by:

- Adding 4-port copper or fiber Token Ring modules to the Catalyst 3900 expansion slots for up to eight additional Token Ring ports per switch.
- Connecting Catalyst 3900 to an OC-3c ATM backbone and ATM LAN Emulation.
- Connecting Catalyst 3900s together via ISL for Token Ring transport over Fast Ethernet.
- Connecting two Catalyst 3900 or 3920 switches together using any of the ports on each switch, to form a TokenChannel. TokenChannels are two to eight parallel links that connect Catalyst 3900 or 3920 switches. TokenChannels provide a capacity between the two Catalyst 3900 or 3920 switches of up to 128 Mbps in half-duplex (HDX) mode, and up to 256 Mbps if all ports in the TokenChannel are operating in full-duplex (FDX) mode.
- Connecting two Catalyst 3900 or 3920 switches together using the stack port in a back-to-back configuration.
- Connecting up to eight Catalyst 3900 or 3920 switches together using the stack port, and a Catalyst 3020 Matrix.

To aid in network management, the Catalyst 3900 or 3920 also maintain status information and a variety of statistics. Status information is available for each port and for each TokenChannel, if defined. Statistics are kept by port, by VLAN, and for the switch as a whole.

The Catalyst 3900 and 3920 also contain an SNMP MIB-II-compliant management agent that allows a customer-supplied SNMP-based network management system (such as CiscoView) to remotely monitor and control the Catalyst 3900 or 3920.

In addition, the Catalyst 3900 and 3920 provide Switched Port Analyzer (SPAN) support, which allows you to monitor traffic on any of the Token Ring ports using a customer-supplied monitoring device such as the Network General Sniffer.

If you need to upgrade the Catalyst 3900 or 3920 software, you can upgrade through the same serial port used for configuration. The code can be downloaded from a customer-supplied programmable workstation using the Xmodem protocol. Code upgrades can also be accomplished using Trivial File Transfer Protocol (TFTP).

Expansion Modules

The Catalyst 3900 has a rear stack port that supports an optional Stack Port module, which provides a 140 Mbps, full-duplex link between back-to-back switches, or between the Catalyst 3900 and the Catalyst Matrix switch for configuration requiring up to eight units in a stack.

Other expansion modules include a 4-port fiber Token Ring module, a 4-port copper Token Ring module, a 2-port copper ISL uplink, a 2-port fiber ISL uplink, and an ATM OC-3C uplink.

Specifications

Hardware

Table 21-104: Technical Specifications for Catalyst 3900

Description	Specifications
Ports	20 1 EIA/TIA-232 console 1 stack port slot (rear) 1 FlexSlot that supports up to 2 expansion modules
Expansion Modules	4-port Token Ring fiber 4-port Token Ring copper 1-port ATM OC-3c 2-port 100BaseTX with ISL 2-port 100BaseFX with ISL
Front panel indicators	System power Mode Fault Port: insert, activity Stack port expansion module: Transmit Receive Attach
Buffers	1 MB DRAM per group of 4 ports
Addresses	6500 per group of 4 ports; 10,000 per system
Protocol compatibility	Transparent to higher-level protocols
Network management	MIB for Network Management of TCP/IP-Based Internets: MIB-II (RFC 1213) Definitions of Managed Objects for Bridges (RFC 1493) Evolution of Interfaces Group of MIB-II (RFC 1573) Token Ring Extensions to the Managed Objects for SRB (RFC 1525) IEEE 802.5 Token Ring MIB (RFC 1748) RMON (RFC 1757) Statistics, History, Alarms, and Events groups RMON Token Ring Extensions (RFC 1513) Token Ring extensions for Statistics, History, Alarms, and Events groups Ring Station Order Group Ring Station Control Table IEEE 802.5 DTR Concentrator MIB IEEE 802.5 DTR MAC MIB Catalyst 3900 Enterprise MIB Cisco VLAN Trunking Protocol MIB Cisco Discovery Protocol MIB
Memory	8 MB DRAM
Processor	Intel i960SA

Table 21-105: Power Requirements for Catalyst 3900

Description	Specification
Electrical power	90 to 264 VAC autosensing (single supply)
Frequency	47 to 63 Hz
AC current rating	1.5A @ 115V; 0.75A @ 230V
Thermal dispensation	150W max; 512 BTUs/hr

Table 21-106: Physical and Environmental Specifications for Catalyst 3900

Description	Specification
Dimensions (H x W x D)	3.4 x 17.4 x 15.3 in. (8.6 x 44.2 x 38.7 cm)
Weight	16–18 lb (6–6.7 kg), depending on configuration
Operating temperature	50 to 104°F (10 to 40°C)
Operating relative humidity	8 to 80%
Storage altitude	40,000 ft

Table 21-107: Technical Specifications for Catalyst 3920

Description	Specification
Ports	24 1 EIA/TIA-232 console (rear) 1 stack port slot (rear)
Expansion Modules	
Front panel indicators	System power Mode Fault Port: insert, activity Stack port: Transmit Receive Attach RPS present RPS good on Internal power supply good
Buffers	1 MB DRAM per group of 4 ports
Addresses	6500 per group of 4 ports; 10,000 per system
Protocol compatibility	Transparent to higher-level protocols

Description	Specification
Network management	MIB for Network Management of TCP/IP-Based Internets: MIB-II (RFC 1213) Definitions of Managed Objects for Bridges (RFC 1493) Evolution of Interfaces Group of MIB-II (RFC 1573) Token Ring Extensions to the Managed Objects for SRB (RFC 1525) IEEE 802.5 Token Ring MIB (RFC 1748) RMON (RFC 1757) Statistics, History, Alarms, and Events groups RMON Token Ring Extensions (RFC 1513) Token Ring extensions for Statistics, History, Alarms, and Events groups Ring Station Order Group Ring Station Control Table IEEE 802.5 DTR Concentrator MIB IEEE 802.5 DTR MAC MIB Catalyst 3900 Enterprise MIB
Memory	8 MB DRAM
Processor	Intel i960SA

Table 21-108: Power Requirements for Catalyst 3920

Description	Specification
Electrical power	90 to 264 VAC autosensing
Frequency	47 to 63 Hz
AC current rating	1.5A @ 115V; 0.75A @ 230V
Thermal dispensation	75 W max; 256 Btus/hr

Table 21-109: Physical and Environmental Specifications for Catalyst 3920

Description	Specification
Dimensions (H x W x D)	1.72 x 19 x 11.1 in. (4.36 x 48.3 x 28.2 cm)
Weight	10 lb (4.54 kg)
Operating temperature	50 to 104°F (10 to 40°C)
Operating relative humidity	8 to 80%
Storage altitude	40,000 ft

Software

For software specification information, access Cisco Connection Online at <http://www.cisco.com>.

Ordering Information

Where to buy Cisco products

Visit http://www.cisco.com/public/ordering_info.shtml

Product and Part Numbers

Part Numbers for the Catalyst 3900 Series

Part Description	Part Number
Catalyst 3900	
Catalyst 3900 Series Workgroup Switches	
Catalyst 3900 20-Port Token Ring Switch	WS-C3900
Catalyst 3920 24-Port Token Ring Switch	WS-C3920
Modules for the Catalyst 3900	
Catalyst 3900 Stack Port Module	WS-C3900-STACK
Catalyst 3900 Stack Port Module	WS-C3900-STACK=
1 Port 155 Mbps ATM Feature Card (MMF, SC)	WS-C3900-ATMSC
1 Port 155 Mbps ATM Feature Card (MMF, SC)	WS-C3900-ATMSC=
4 Port Token Ring Feature Card (UTP/STP,RJ45)	WS-C3900-4R
4 Port Token Ring Feature Card (UTP/STP,RJ45)	WS-C3900-4R=
4 Port Fiber Token Ring Feature Card (MMF, ST)	WS-C3900-4RF
4 Port Fiber Token Ring Feature Card (MMF, ST)	WS-C3900-4RF=
2 port 100BaseTX With ISL Feature Card (UTP, RJ45)	WS-C3900-2ISL
2 port 100BaseTX With ISL Feature Card (UTP, RJ45)	WS-C3900-2ISL=
2 Port 100BaseFX With ISL Feature Card (MMF, SC)	WS-C3900-2ISLF
2 Port 100BaseFX with ISL Feature Card (MMF,SC)	WS-C3900-2ISLF=
CATALYST MATRIX	WS-C3020
CATALYST MATRIX REDUNDANT COMPONENT	WS-X3021=
Catalyst 3900 Agent Licenses	
Catalyst 3900 RMON Agent License	WS-C3900-EMS-LIC

Documentation

For part numbers for product specific documentation, visit

http://www.cisco.com/univercd/cc/td/doc/pcat/swdo__d1.htm

